

**Amendments to the Claims:**

Please amend claims 1-6, 19, 22, 23, and 38-40 herein. Please cancel claims 32-37 without prejudice to the filing of one or more divisional applications including same. Please note that all claims currently pending and under consideration in the above-referenced application are shown below. Please enter these claims as amended. This listing of claims will replace all prior versions and listings of claims in the application.

**Listing of Claims:**

1. (Currently amended) A method of reactivating a catalyst, comprising:  
 providing a catalyst that is at least partially deactivated by ~~one or more fouling agents, the catalyst comprising a solid catalyst or a liquid catalyst~~ at least one fouling agent;  
 contacting the catalyst with a fluid reactivating agent that is at or above a critical point of the fluid reactivating agent and is of sufficient density to dissolve ~~impurities~~ impurities, wherein the fluid reactivating agent is capable of transferring a hydride ion to the at least one fouling agent;  
 reacting the fluid reactivating agent with the at least one fouling agent;  
 releasing the at least one fouling agent from the catalyst;  
 removing the at least one fouling agent from the fluid reactivating agent; and  
 recycling the fluid reactivating agent.
  
2. (Currently amended) The method of claim 1, wherein providing a catalyst that is at least partially deactivated by ~~one or more fouling agents~~ at least one fouling agent comprises providing the catalyst that catalyzes an alkylation reaction, a transesterification reaction, an esterification reaction, an oligomerization reaction, a polymerization reaction, or an isomerization reaction.
  
3. (Currently amended) The method of claim 1, wherein providing a catalyst that is at least partially deactivated by ~~one or more fouling agents~~ at least one fouling agent comprises providing the catalyst that includes an acid functionality or a base ~~functionality~~ functionality.

4. (Currently amended) The method of claim 1, wherein providing a catalyst that is at least partially deactivated by ~~one or more fouling agents at least one fouling agent~~ comprises providing the catalyst that is at least partially deactivated by at least one hydrogen deficient fouling agent.

5. (Currently amended) The method of claim 1, wherein contacting the catalyst with a fluid reactivating agent that is at or above a critical point of the fluid reactivating agent and is of sufficient density to dissolve impurities comprises contacting the catalyst with the fluid reactivating agent ~~comprising that is at or above the critical point of the fluid reactivating agent and that comprises~~ a solvent that reacts with the at least one fouling agent ~~in a way that facilitates their to facilitate~~ removal, in total or in part, of the at least one fouling agent from a surface of the catalyst.

6. (Currently amended) The method of claim 1, wherein ~~contacting the catalyst with a fluid reactivating agent that is at or above a critical point of the fluid reactivating agent and is of sufficient density to dissolve impurities comprises contacting the catalyst with the fluid reactivating agent that is capable of transferring a hydride ion to the~~ at least one fouling agent providing a catalyst that is at least partially deactivated by at least one fouling agent comprises providing a solid catalyst or a liquid catalyst that is at least partially deactivated by at least one fouling agent.

7. (Original) The method of claim 1, wherein contacting the catalyst with a fluid reactivating agent that is at or above a critical point of the fluid reactivating agent and is of sufficient density to dissolve impurities comprises contacting the catalyst with the fluid reactivating agent comprising an alkane having at least one tertiary carbon atom or a compound that can be isomerized in the presence of the catalyst to form at least one tertiary carbon atom.

8. (Original) The method of claim 1, wherein contacting the catalyst with a fluid reactivating agent that is at or above a critical point of the fluid reactivating agent and is of sufficient density to dissolve impurities comprises contacting the catalyst with the fluid reactivating agent comprising a compound selected from the group consisting of isobutane,

isopentane, and mixtures thereof.

9. (Original) The method of claim 1, wherein contacting the catalyst with a fluid reactivating agent that is at or above a critical point of the fluid reactivating agent and is of sufficient density to dissolve impurities comprises contacting the catalyst with the fluid reactivating agent comprising a compound selected from the group consisting of n-butane, n-pentane, and mixtures thereof.

10. (Original) The method of claim 1, wherein contacting the catalyst with a fluid reactivating agent that is at or above a critical point of the fluid reactivating agent and is of sufficient density to dissolve impurities comprises contacting the catalyst with the fluid reactivating agent comprising an aromatic compound selected from the group consisting of benzene, toluene, ethylbenzene, and mixtures thereof.

11. (Original) The method of claim 1, wherein contacting the catalyst with a fluid reactivating agent that is at or above a critical point of the fluid reactivating agent and is of sufficient density to dissolve impurities comprises contacting the catalyst with the fluid reactivating agent comprising at least one of a dissolved species of hydrogen or oxygen.

12. (Original) The method of claim 1, wherein contacting the catalyst with a fluid reactivating agent that is at or above a critical point of the fluid reactivating agent and is of sufficient density to dissolve impurities comprises contacting the catalyst with the fluid reactivating agent at pressure and temperature conditions such that the fluid reactivating agent is a critical fluid.

13. (Original) The method of claim 1, wherein contacting the catalyst with a fluid reactivating agent that is at or above a critical point of the fluid reactivating agent and is of sufficient density to dissolve impurities comprises contacting the catalyst with the fluid reactivating agent at a pressure equal to a critical pressure (" $P_c$ ") and at a temperature equal to a critical temperature (" $T_c$ ").

14. (Original) The method of claim 1, wherein contacting the catalyst with a fluid reactivating agent that is at or above a critical point of the fluid reactivating agent and is of sufficient density to dissolve impurities comprises contacting the catalyst with the fluid reactivating agent at pressure and temperature conditions such that the fluid reactivating agent is a supercritical fluid.

15. (Original) The method of claim 1, wherein contacting the catalyst with a fluid reactivating agent that is at or above a critical point of the fluid reactivating agent and is of sufficient density to dissolve impurities comprises contacting the catalyst with the fluid reactivating agent at a pressure greater than  $P_c$  and at a temperature greater than  $T_c$ .

16. (Original) The method of claim 1, wherein contacting the catalyst with a fluid reactivating agent that is at or above a critical point of the fluid reactivating agent and is of sufficient density to dissolve impurities comprises contacting the catalyst with the fluid reactivating agent at a pressure in the range of about  $0.1 P_c$  to about  $8 P_c$ , and a temperature in the range of about  $0.9 T_c$  to about  $1.3 T_c$ .

17. (Original) The method of claim 1, wherein contacting the catalyst with a fluid reactivating agent that is at or above a critical point of the fluid reactivating agent and is of sufficient density to dissolve impurities comprises contacting the catalyst with isobutane at a temperature in the range of about  $100^{\circ}\text{C}$  to about  $300^{\circ}\text{C}$ .

18. (Original) The method of claim 1, wherein contacting the catalyst with a fluid reactivating agent that is at or above a critical point of the fluid reactivating agent and is of sufficient density to dissolve impurities comprises contacting the catalyst with isobutane at a pressure in the range of about 200 psig to about 5000 psig.

19. (Currently amended) The method of claim 1, wherein contacting the catalyst with a fluid reactivating agent that is at or above a critical point of the fluid reactivating agent and is of sufficient density to dissolve impurities comprises contacting the catalyst with a fluid reactivating agent that is at or above a critical point of the fluid reactivating agent and is of

sufficient density to dissolve at least one of the at least one fouling agents-agent and products of a reaction of the fluid reactivating agent with the at least one fouling agents-agent.

20. (Original) The method of claim 1, wherein reacting the fluid reactivating agent with the at least one fouling agent comprises stabilizing the at least one fouling agent.

21. (Original) The method of claim 1, wherein reacting the fluid reactivating agent with the at least one fouling agent comprises transferring a hydride ion from the fluid reactivating agent to the at least one fouling agent.

22. (Currently amended) The method of claim 1, wherein releasing the at least one fouling agent from the catalyst comprises releasing the at least one fouling agent having a molecular weight approximately equal to or higher than the molecular weight of the at least one fouling agent deposited on the ~~solid~~-catalyst.

23. (Currently amended) The method of claim 1, wherein releasing the at least one fouling agent from the ~~solid~~-catalyst comprises desorbing the at least one fouling agent from the ~~solid~~-catalyst and dissolving the at least one fouling agent in the fluid reactivating agent.

24. (Original) The method of claim 1, wherein removing the at least one fouling agent from the fluid reactivating agent comprises adsorbing the at least one fouling agent to a solid material.

25. (Original) The method of claim 24, wherein adsorbing the at least one fouling agent to a solid material comprises adsorbing the at least one fouling agent to a solid material selected from the group consisting of alumina, molecular sieves, and activated carbon.

26. (Original) The method of claim 1, wherein removing the at least one fouling agent from the fluid reactivating agent comprises removing the at least one fouling agent from the fluid reactivating agent in a supercritical phase, a liquid phase, or a gas phase.

27. (Original) The method of claim 1, wherein removing the at least one fouling agent from the fluid reactivating agent comprises precipitating the at least one fouling agent from the fluid reactivating agent.

28. (Original) The method of claim 27, wherein precipitating the at least one fouling agent comprises altering solubility properties of the fluid reactivating agent.

29. (Original) The method of claim 1, wherein removing the at least one fouling agent from the fluid reactivating agent comprises using the at least one fouling agent with a recycling catalyst.

30. (Original) The method of claim 1, wherein recycling the fluid reactivating agent comprises reusing the fluid reactivating agent as at least a portion of the feed mix or as a reactivating agent.

31. (Original) The method of claim 1, wherein recycling the fluid reactivating agent comprises using a first portion of the fluid reactivating agent as at least a portion of a feed mix and a second portion of the fluid reactivating agent as a reactivating agent.

Claims 32-37 (Canceled)

38. (Currently amended) A method of reactivating a catalyst, comprising:  
directing a fluid reactivating agent towards at least one catalyst that is at least partially deactivated by ~~fouling agents~~at least one fouling agent, the at least one catalyst located in at least one ~~reactor~~reactor, wherein the fluid reactivating agent is capable of transferring a hydride ion to the at least one fouling agent;

contacting the at least one catalyst with the fluid reactivating agent that is at or above a critical point of the fluid reactivating agent and is of sufficient density to dissolve impurities;  
reacting the fluid reactivating agent with the at least one fouling agent;  
forming a contaminated fluid reactivating agent comprising the at least one fouling agent;  
directing the contaminated fluid reactivating agent to a reactivating agent recovery;

removing the at least one fouling agent from the fluid reactivating agent; and recycling the fluid reactivating agent.

39. (Currently amended) The method of claim 38, wherein directing a fluid reactivating agent towards at least one catalyst that is at least partially deactivated by ~~fouling agents~~at least one fouling agent comprises directing the fluid reactivating agent towards at least one liquid catalyst or at least one solid catalyst.

40. (Currently amended) The method of claim 38, wherein directing a fluid reactivating agent towards at least one catalyst that is at least partially deactivated by ~~fouling agents~~at least one fouling agent comprises directing the fluid reactivating agent using a first pumping device.

41. (Original) The method of claim 38, wherein directing the contaminated fluid reactivating agent to a reactivating agent recovery comprises directing the contaminated fluid reactivating agent using a second pumping device configured and operably coupled to direct the contaminated fluid reactivating agent to the reactivating agent recovery.

42. (Original) The method of claim 38, wherein recycling the fluid reactivating agent comprises recycling the fluid reactivating agent using a third pumping device configured and operably coupled to recirculate clean fluid reactivating agent from the reactivating agent recovery to the at least one reactor.

43. (Original) The method of claim 38, wherein contacting the at least one catalyst with the fluid reactivating agent that is at or above a critical point of the fluid reactivating agent and is of sufficient density to dissolve impurities comprises generating pressure and temperature conditions such that the fluid reactivating agent is at or above a critical point of the fluid reactivating agent and is of sufficient density to dissolve the impurities.

44. (Original) The method of claim 43, wherein generating pressure and temperature conditions such that the fluid reactivating agent is at or above a critical point of the fluid

reactivating agent and is of sufficient density to dissolve the impurities comprises using at least one of a pressure control device and a temperature control device to generate the pressure and temperature conditions.